

Determination of Nitro-PAHs in Total Suspended Particles of Urban Atmosphere

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Urban air pollution in many cities of the developing world in Asia, particularly in China, is increasing significantly. Atmospheric Particulate Matter (PM) pollution is dangerous to the health of millions of people and is a particular concern [1]. Polycyclic aromatic hydrocarbons (PAHs) and their nitrated derivatives (nitro-PAHs) are environmental pollutants which pose a threat to human health even at low concentration levels [2], e.g. cardiovascular and respiratory morbidity and mortality due to their high carcinogenicities. Therefore, determining the contribution of specific sources to ambient PM levels is an important step toward more effective management of particulate air pollution and to reduced public health risk associated with PM exposure [3].

In this work, an efficient analytical method for the determination of Nitro-PAHs in Total Suspended Particle (TSP) of urban atmosphere, using methanol as solvent for the ultrasonic extraction of particle sample, followed by HPLC - UV/MS detection, has been developed. The efficiency of extraction was proved to be sufficient for the sample pre-treatment. HPLC operation condition is shown as following: ALLTIMA C18 5micron ST4.6×150 column, methanol: water=2:98, flow rate of 0.6 mL/min, UV wavelength for detection at 254 nm. Experimental results showed that the calibration was well founded for target compounds. 9-nitroanthracene, 2-nitrofluorene, 1-nitropyrene, 7-nitrobenz[a]anthracene were detected in the real TSP sample from the sampling sites of Hong Kong and Guangzhou, south China, with contents of 162 ng/m³, 541 ng/m³, 1.55 ng/m³, 1.31 ng/m³, respectively. These contents are relatively higher than those from previous works elsewhere.

References

1. To Thi Hien et al. Nitro-polycyclic aromatic hydrocarbons and polycyclic aromatic hydrocarbons in particulate matter in an urban area of a tropical region: Ho Chi Minh City, Vietnam. *Atmospheric Environment* 41: 7715-7725 (2007)
2. Schauer, C., Niessner, R. & Poeschl, U. Analysis of nitrated polycyclic aromatic hydrocarbons by liquid chromatography with fluorescence and mass spectrometry detection: air particle matter, soot, and reaction product studies. *Analytical and Bioanalytical Chemistry* 378, 725~738 (2004).
3. Miller-Schulze J.P. et al. Exposures to particulate air pollution and nitro-polycyclic aromatic hydrocarbons among taxi drivers in Shenyang, China. *Environ. Sci. & Technol.* (in press)